US010097970B2

(12) **United States Patent**
Cho

(10) **Patent No.: US 10,097,970 B2**
(45) **Date of Patent: Oct. 9, 2018**

(54) **METHOD AND APPARATUS FOR DISPLAYING MISSED CALLS ON MOBILE TERMINAL**

(71) Applicant: **Samsung Electronics Co. Ltd.**, Suwon-si, Gyeonggi-do (KR)

(72) Inventor: **Jaewan Cho**, Suwon-si (KR)

(73) Assignee: **Samsung Electronics Co., Ltd.**, Suwon-si (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/021,358**

(22) Filed: **Sep. 9, 2013**

(65) **Prior Publication Data**

US 2014/0080465 A1 Mar. 20, 2014

(30) **Foreign Application Priority Data**

Sep. 20, 2012 (KR) 10-2012-0104722

(51) **Int. Cl.**

H04W 4/12 (2009.01)
H04M 1/725 (2006.01)
H04M 1/57 (2006.01)

(52) **U.S. Cl.**

CPC ***H04W 4/12*** (2013.01); ***H04M 1/72519*** (2013.01); *H04M 1/57* (2013.01); *H04M 1/576* (2013.01); *H04M 2250/60* (2013.01)

(58) **Field of Classification Search**

CPC H04M 2250/60; H04M 1/72159; H04M 1/57; H04M 1/576; H04W 4/12
USPC 455/415, 566, 567; 379/29.1, 88.11, 379/88.12, 93.17, 93.23, 142.17, 167.12, 379/428.1, 433.04; 345/156, 440.1, 553
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,283,813	B2	10/2007	Hamanaga et al.	
8,712,384	B1 *	4/2014	Goyal	H04M 3/537 379/88.18
2003/0166409	A1 *	9/2003	Ishii	H04M 1/6066 455/569.1
2006/0178135	A1 *	8/2006	Jiang	H04M 3/42042 455/414.1
2006/0229063	A1	10/2006	Koch	
2007/0081641	A1 *	4/2007	Veen et al.	379/93.07
2007/0271527	A1	11/2007	Paas et al.	
2008/0055263	A1 *	3/2008	Lemay et al.	345/173
2008/0057926	A1 *	3/2008	Forstall	G06F 3/0482 455/415

(Continued)

FOREIGN PATENT DOCUMENTS

CN	1674607	A	9/2005
CN	101484870	A	7/2009

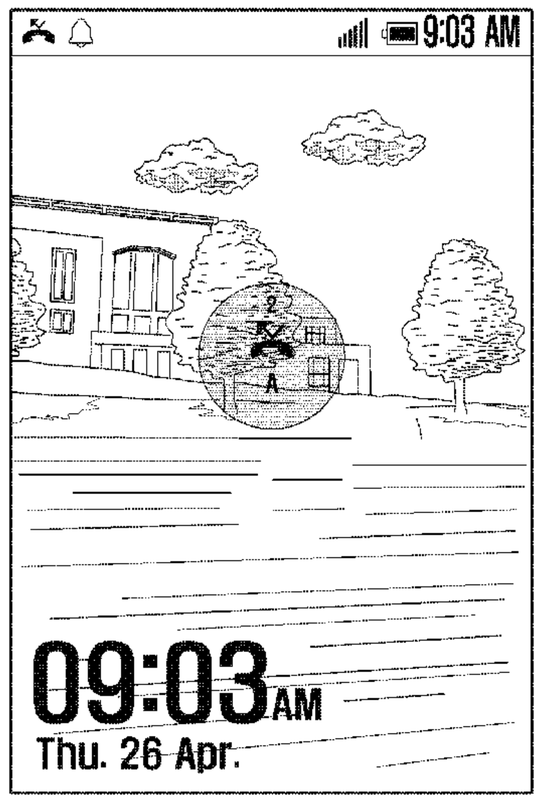
(Continued)

Primary Examiner — Kashif Siddiqui
(74) *Attorney, Agent, or Firm* — Jefferson IP Law, LLP

(57) **ABSTRACT**

A displaying method and apparatus in a mobile terminal are provided. The displaying method in a mobile terminal includes displaying a message for a missed call for a first number on an idle screen or a call list screen when the missed call is generated from the first number, displaying a call history for the first number on an incoming call screen or an outgoing call screen when a call is received from the first number or the call is transmitted to the first number, and changing the message for the missed call for the first number when a call is connected to the first number and displaying the changed message.

30 Claims, 20 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

2008/0125178	A1	5/2008	Park et al.	
2008/0248761	A1*	10/2008	Seo	H04M 1/575 455/90.2
2009/0011741	A1	1/2009	Maguire et al.	
2009/0175264	A1*	7/2009	Reitalu	H04M 1/2535 370/352
2009/0265666	A1	10/2009	Hsieh et al.	
2009/0271407	A1*	10/2009	Hawkins et al.	707/6
2010/0146384	A1	6/2010	Peev et al.	
2012/0054683	A1	3/2012	Sands et al.	
2012/0287071	A1*	11/2012	Wang et al.	345/173
2012/0323933	A1*	12/2012	He	G06Q 10/109 707/749
2013/0005315	A1*	1/2013	Lemke et al.	455/415
2013/0165185	A1*	6/2013	Guo	H04M 1/57 455/566

FOREIGN PATENT DOCUMENTS

KR	10-2005-0094586	A	9/2005
KR	10-0815522	B1	3/2008
RU	2007137696	A	4/2009
WO	03/056789	A1	7/2003
WO	2007/131316	A1	11/2007

* cited by examiner

FIG. 1

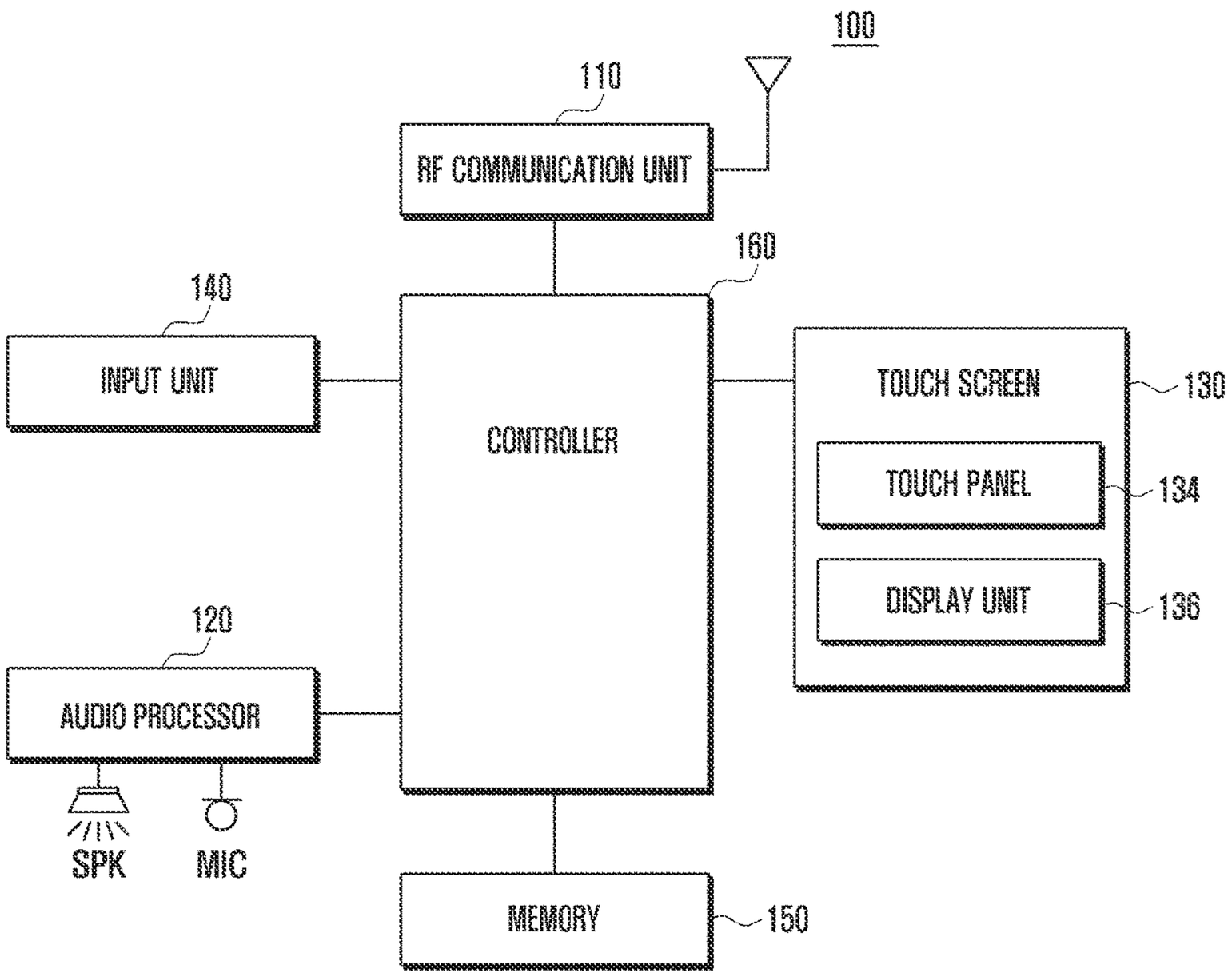

100
110
RF COMMUNICATION UNIT
160
140
INPUT UNIT
CONTROLLER
TOUCH SCREEN
130
TOUCH PANEL
134
DISPLAY UNIT
136
120
AUDIO PROCESSOR
SPK
MIC
MEMORY
150

FIG. 2

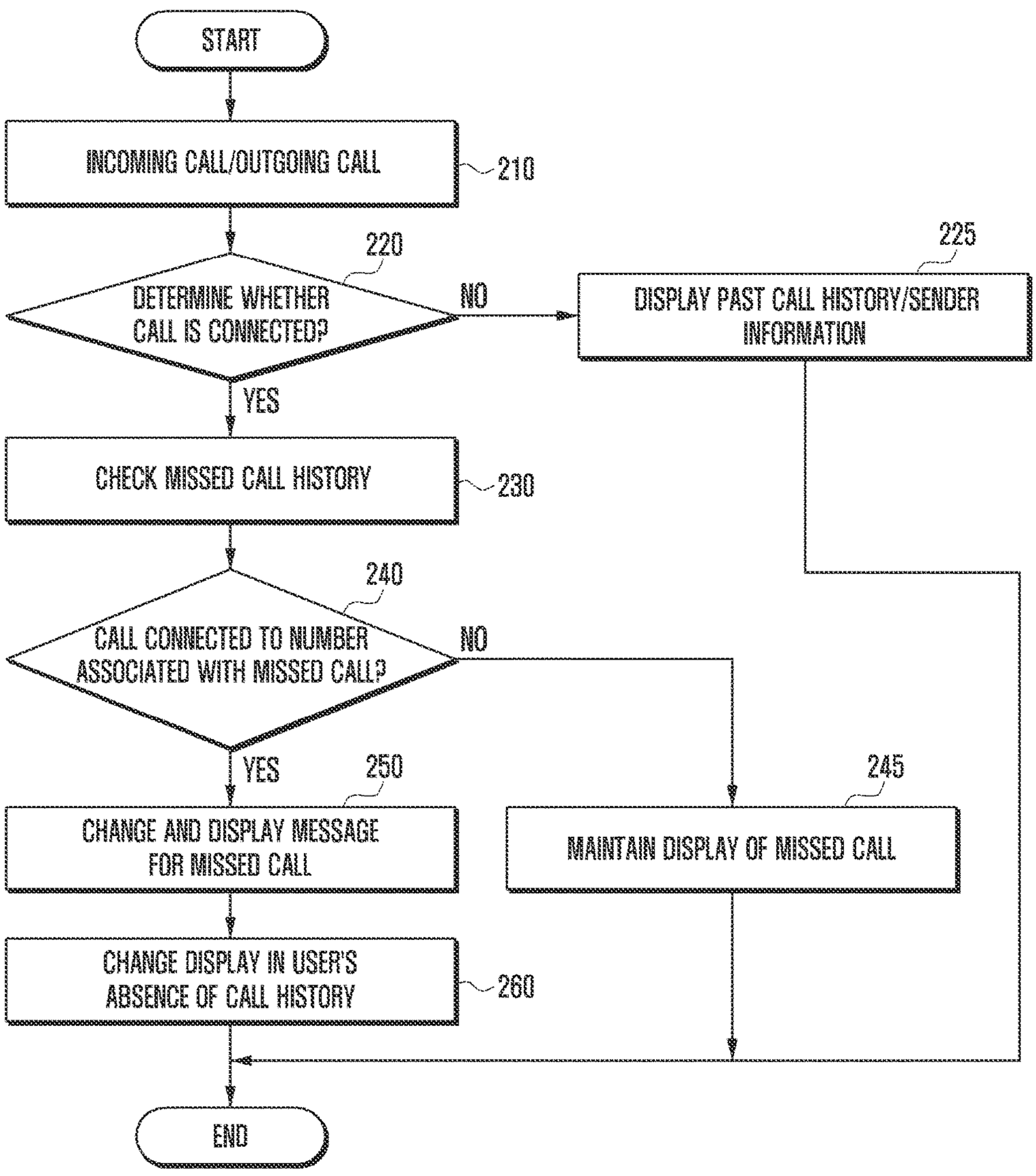

START
INCOMING CALL/OUTGOING CALL
210
220
DETERMINE WHETHER CALL IS CONNECTED?
NO
225
DISPLAY PAST CALL HISTORY/SENDER INFORMATION
YES
CHECK MISSED CALL HISTORY
230
240
CALL CONNECTED TO NUMBER ASSOCIATED WITH MISSED CALL?
NO
YES
250
CHANGE AND DISPLAY MESSAGE FOR MISSED CALL
245
MAINTAIN DISPLAY OF MISSED CALL
CHANGE DISPLAY IN USER'S ABSENCE OF CALL HISTORY
260
END

FIG. 3A

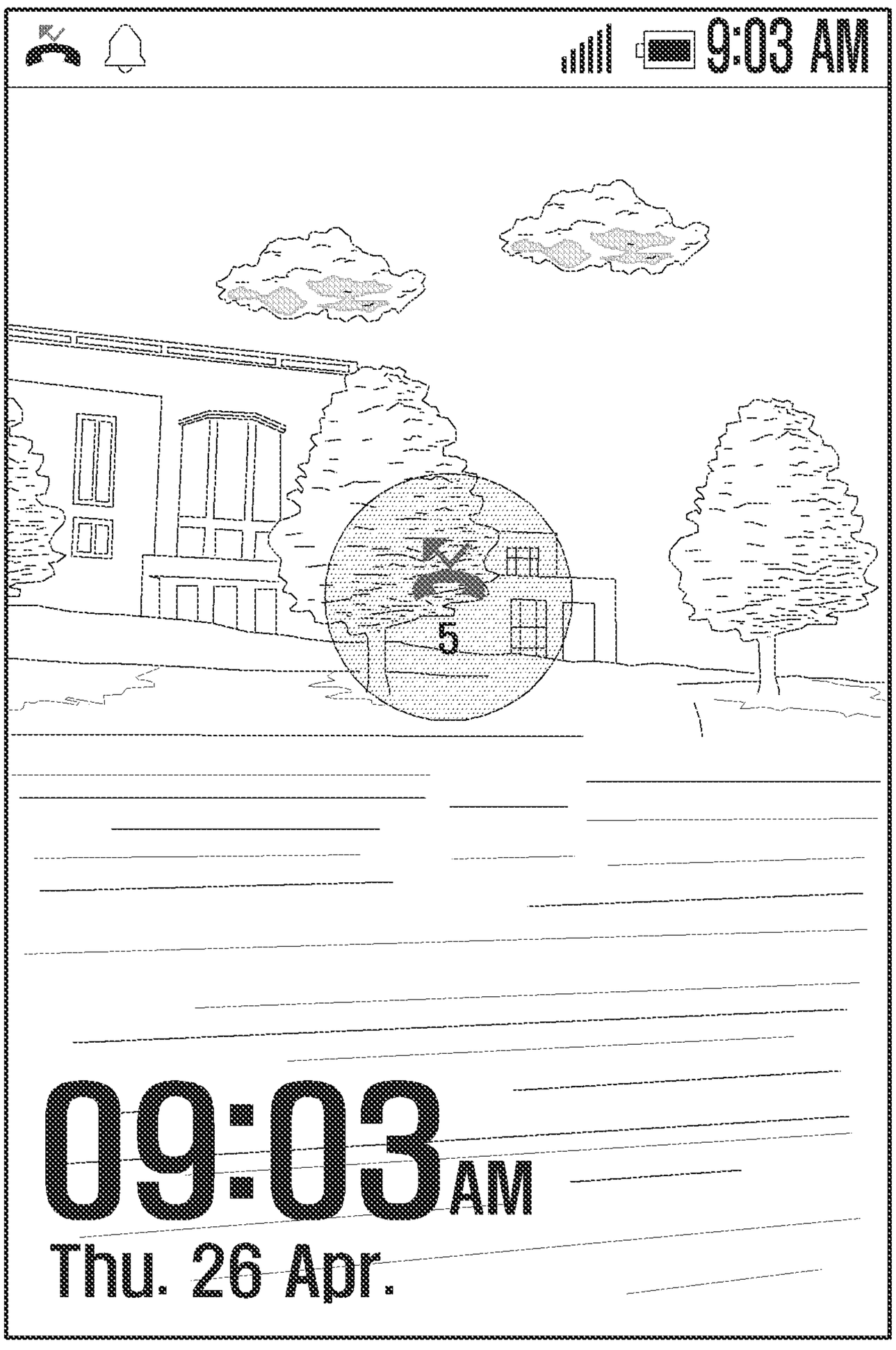


FIG. 3B

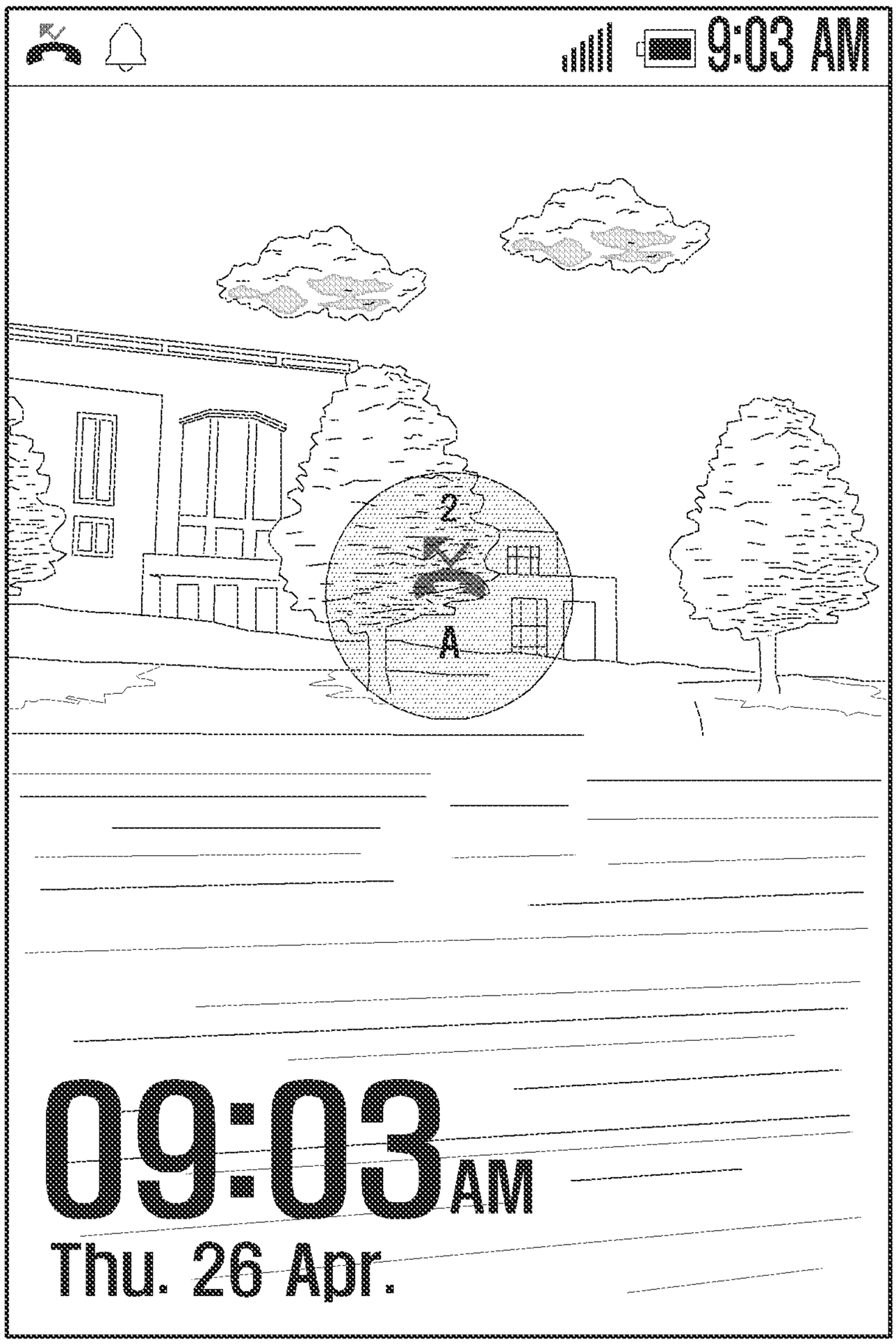


FIG. 3C

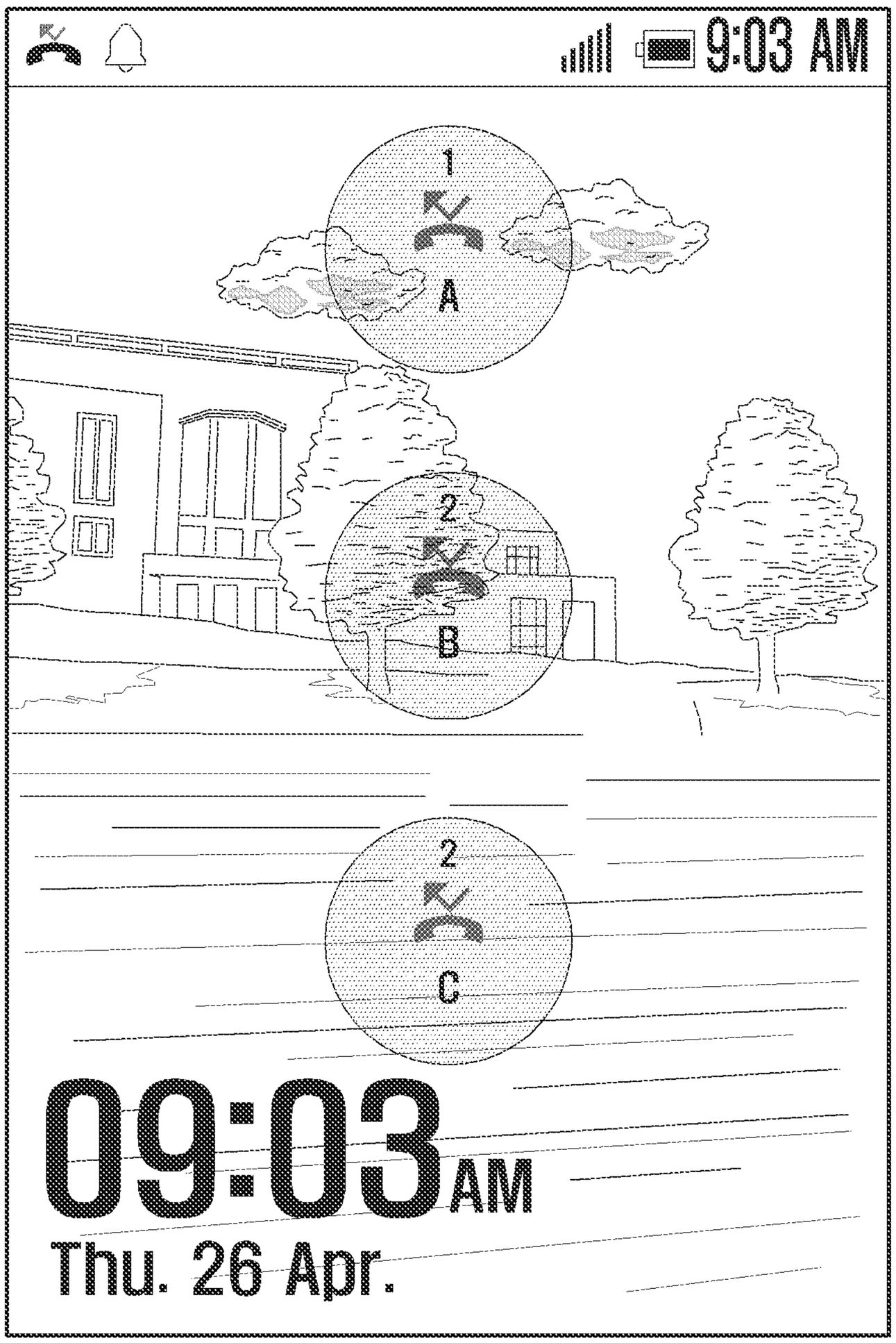


FIG. 3D

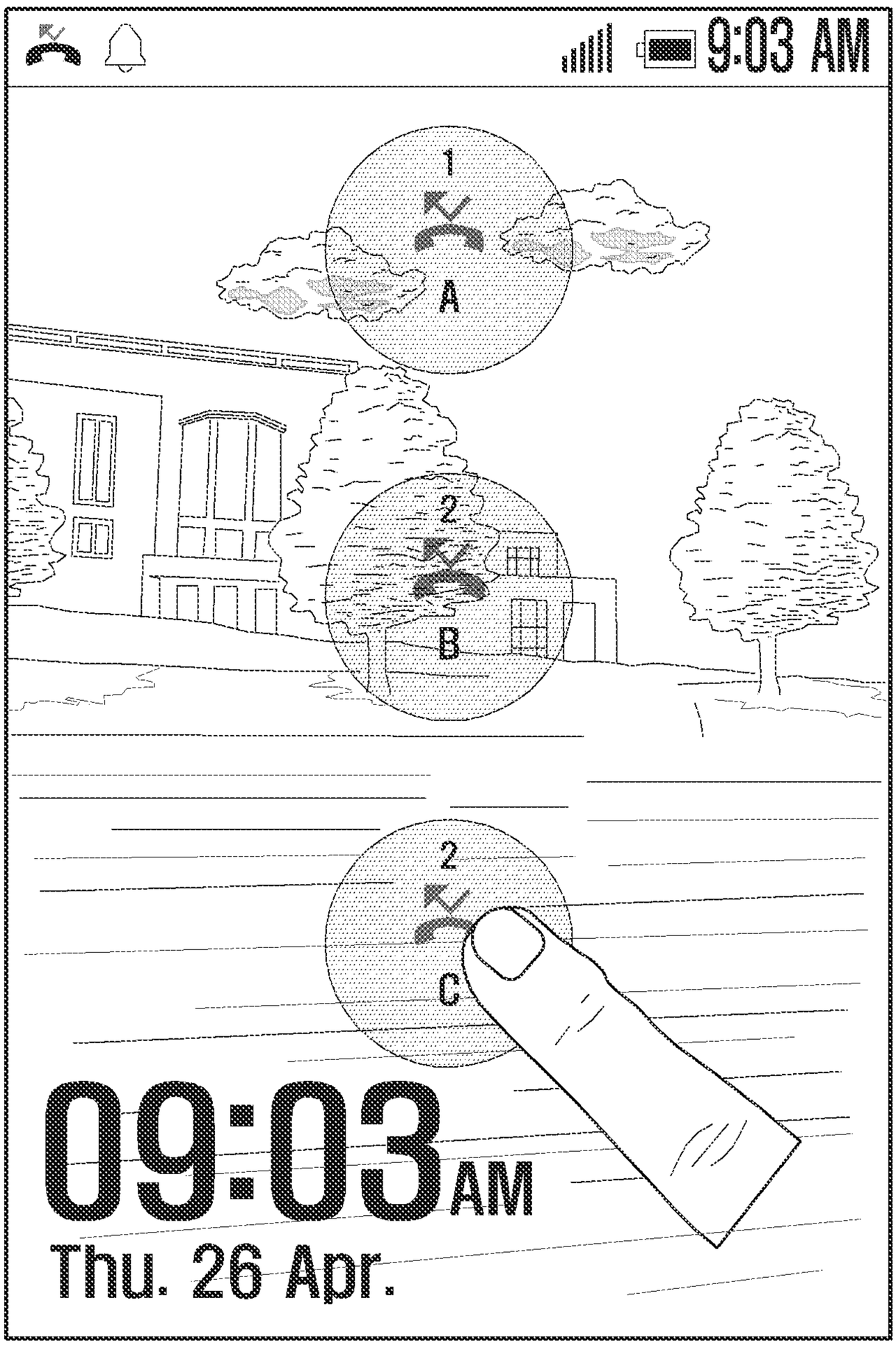


FIG. 3E

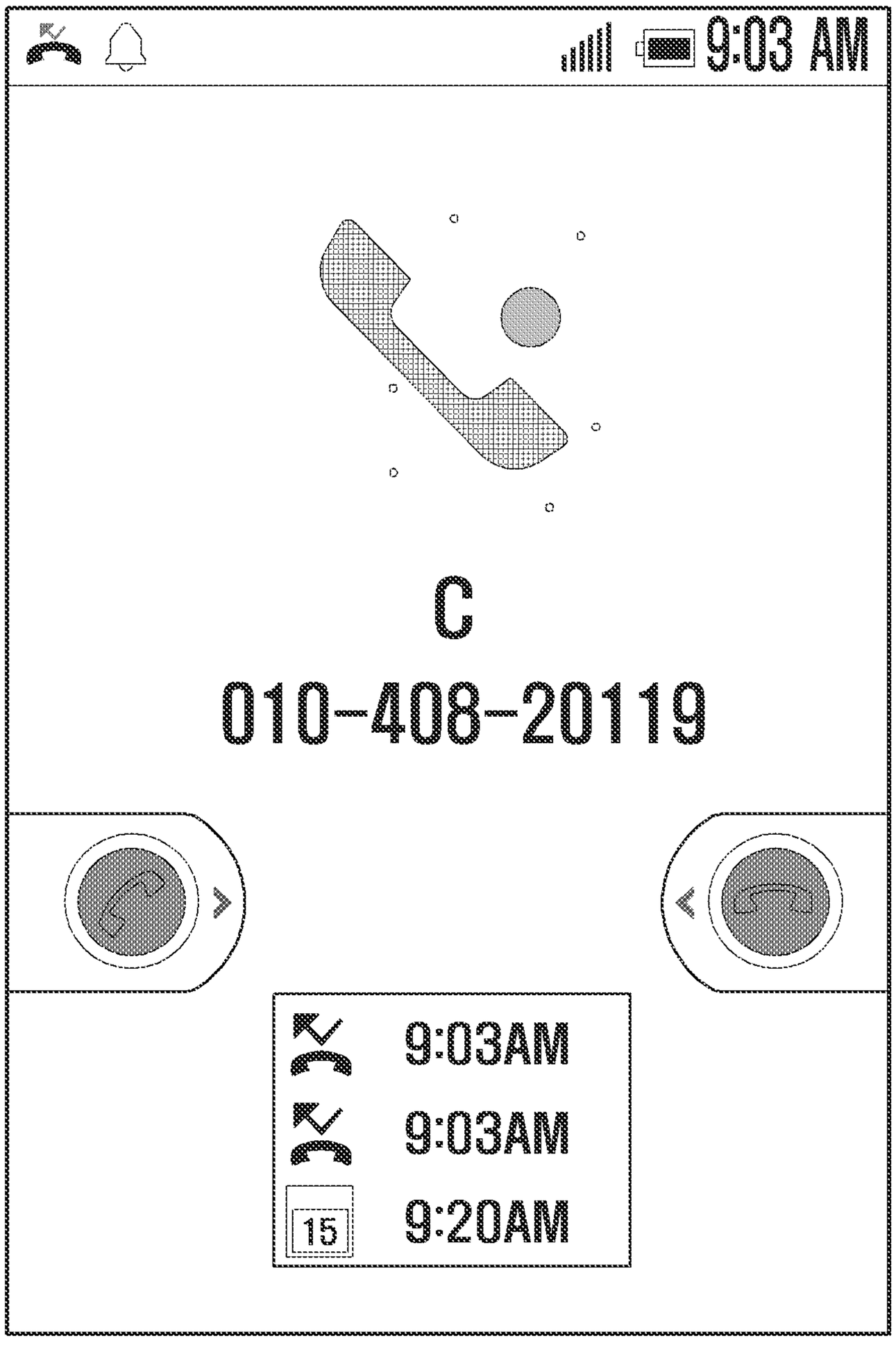


FIG. 3F

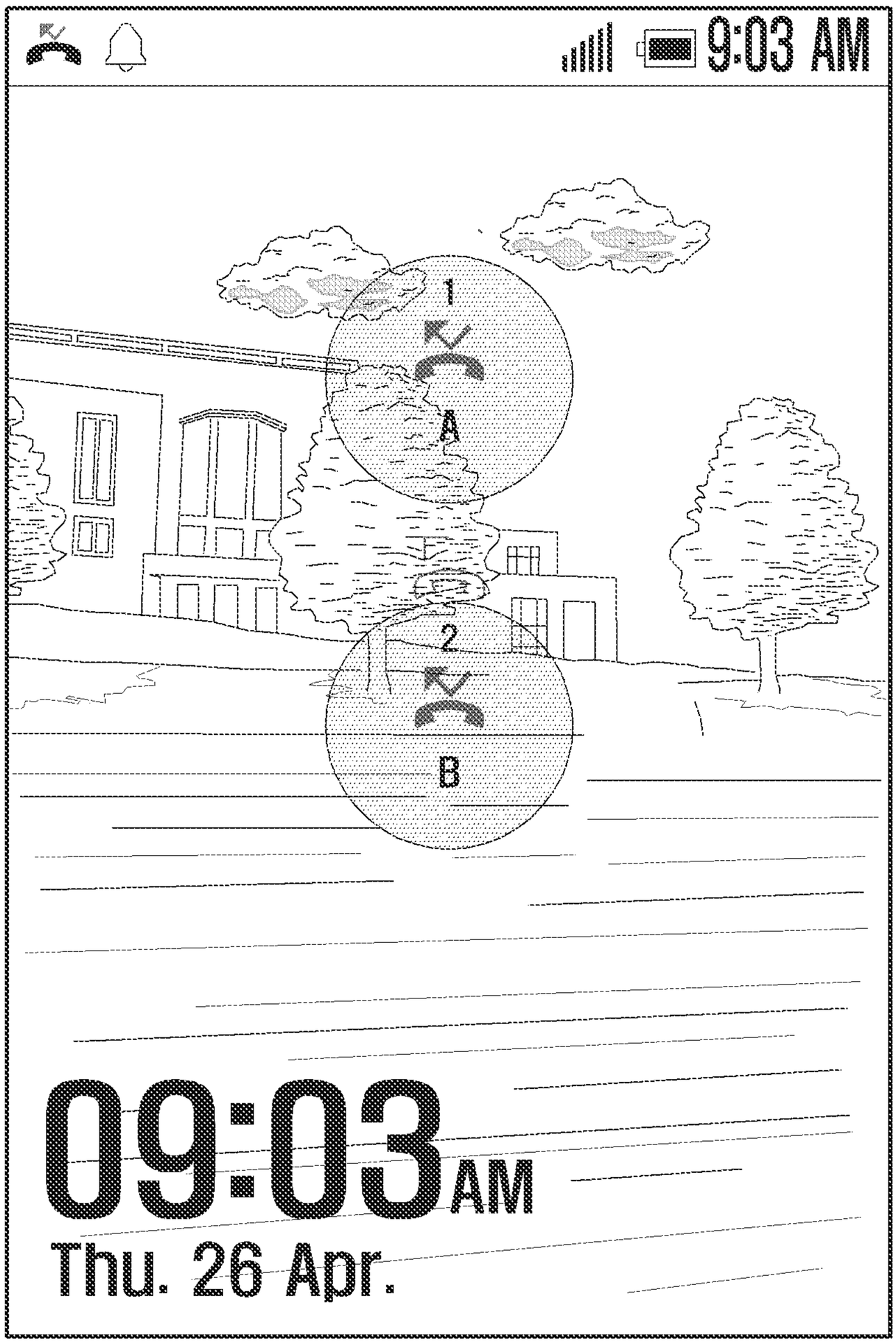


FIG. 4A

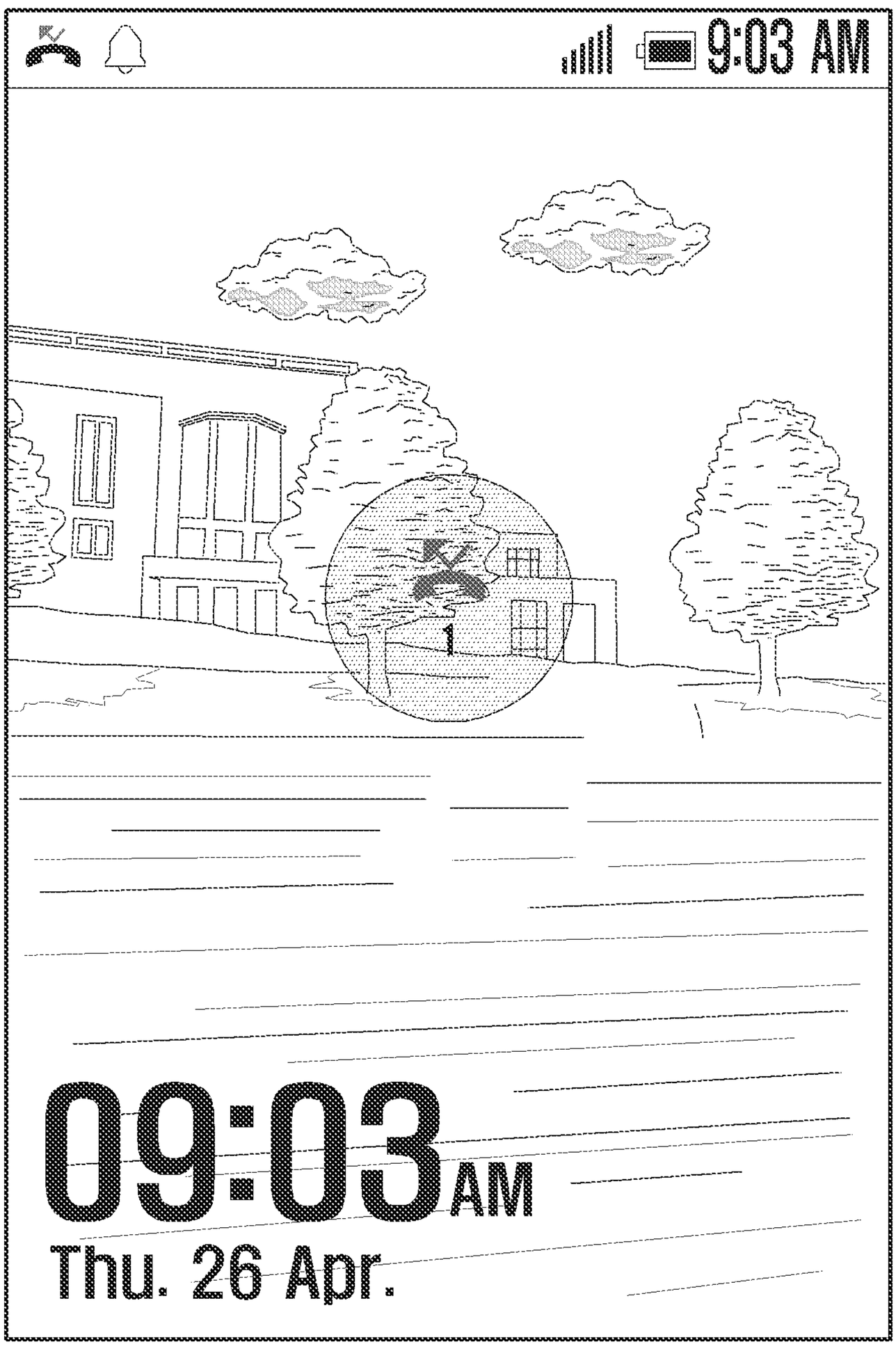


FIG. 4B

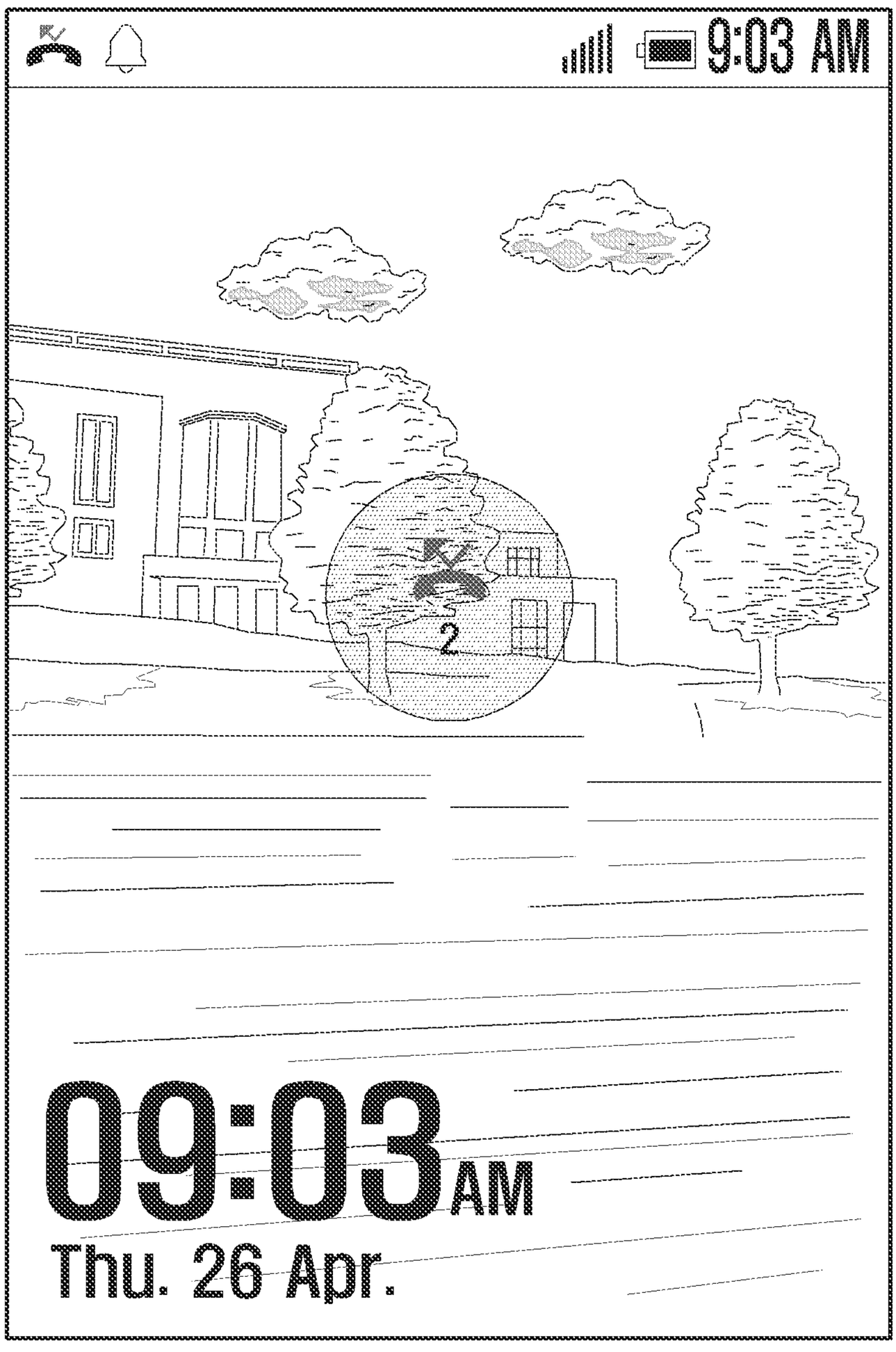


FIG. 4C

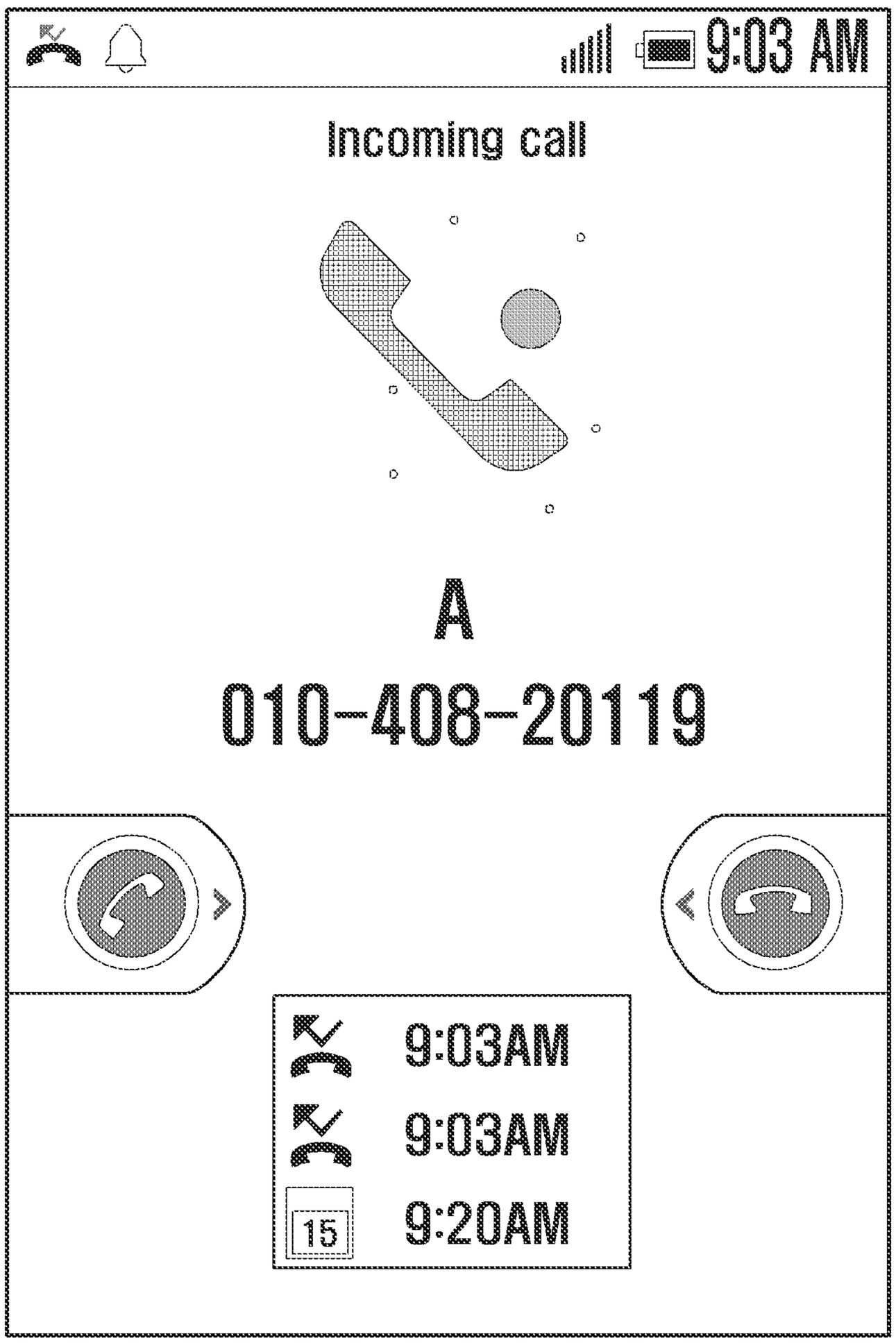


FIG. 4D

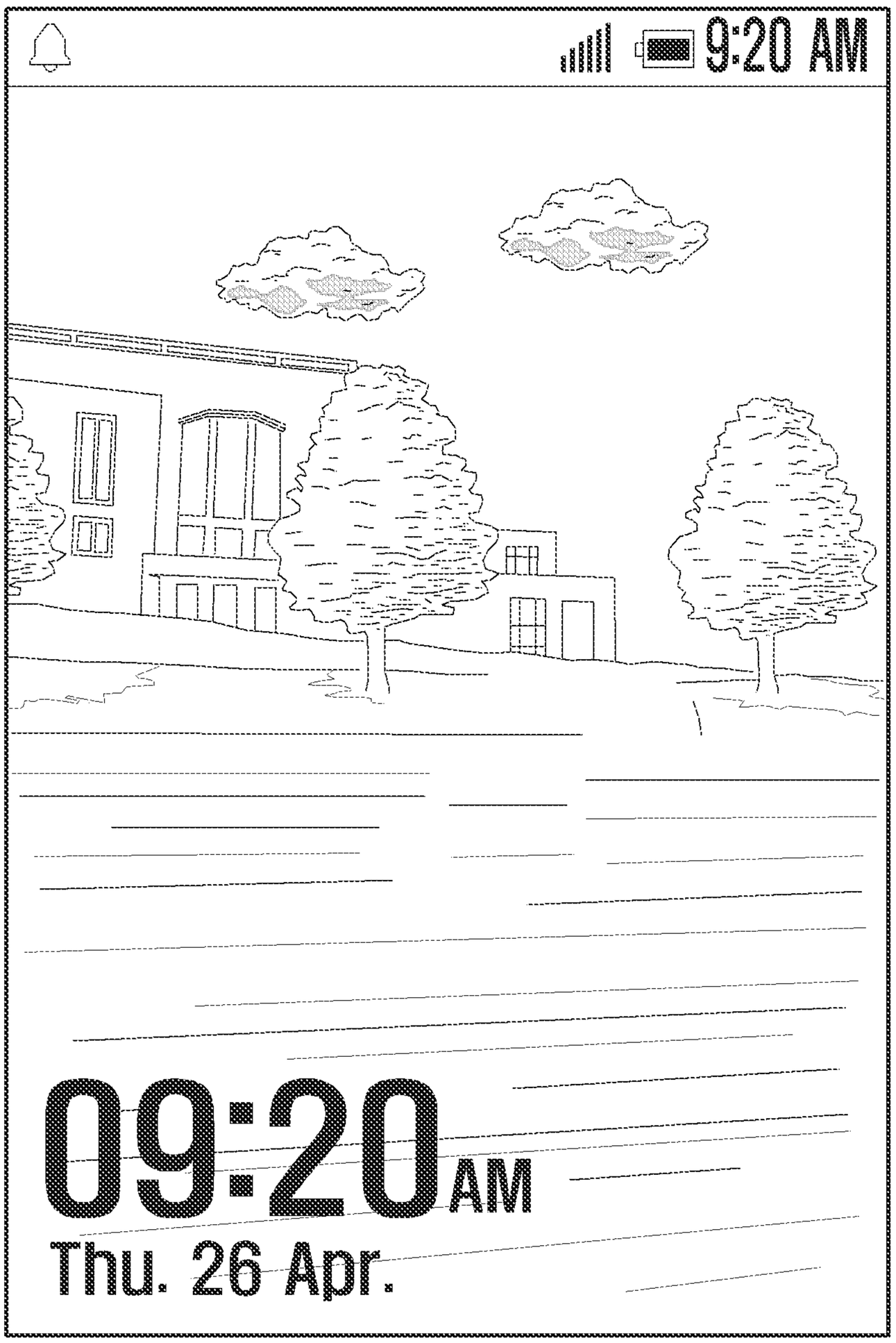


FIG. 4E


9:03 AM
Today
A
010-408-20119
9:03AM
A
010-408-20119
9:03AM
A
010-408-20119
9:02AM
010-8935-8479
010-8935-8479
9:02AM
A
010-408-20119
9:01AM
A
010-408-20119
9:00AM
A
010-408-20119
9:00AM
A
010-408-20119
9:00AM

FIG. 5A

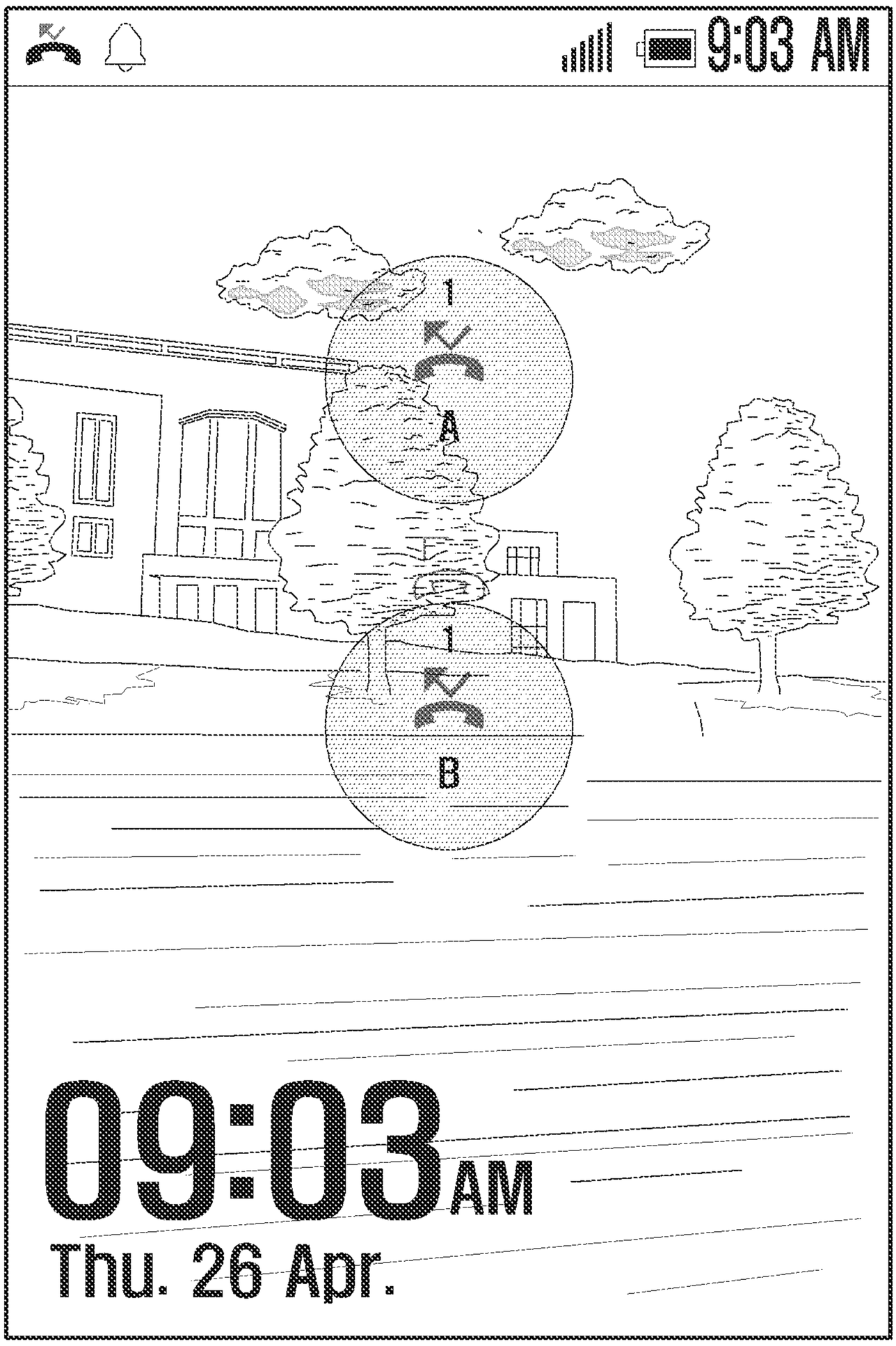


FIG. 5B

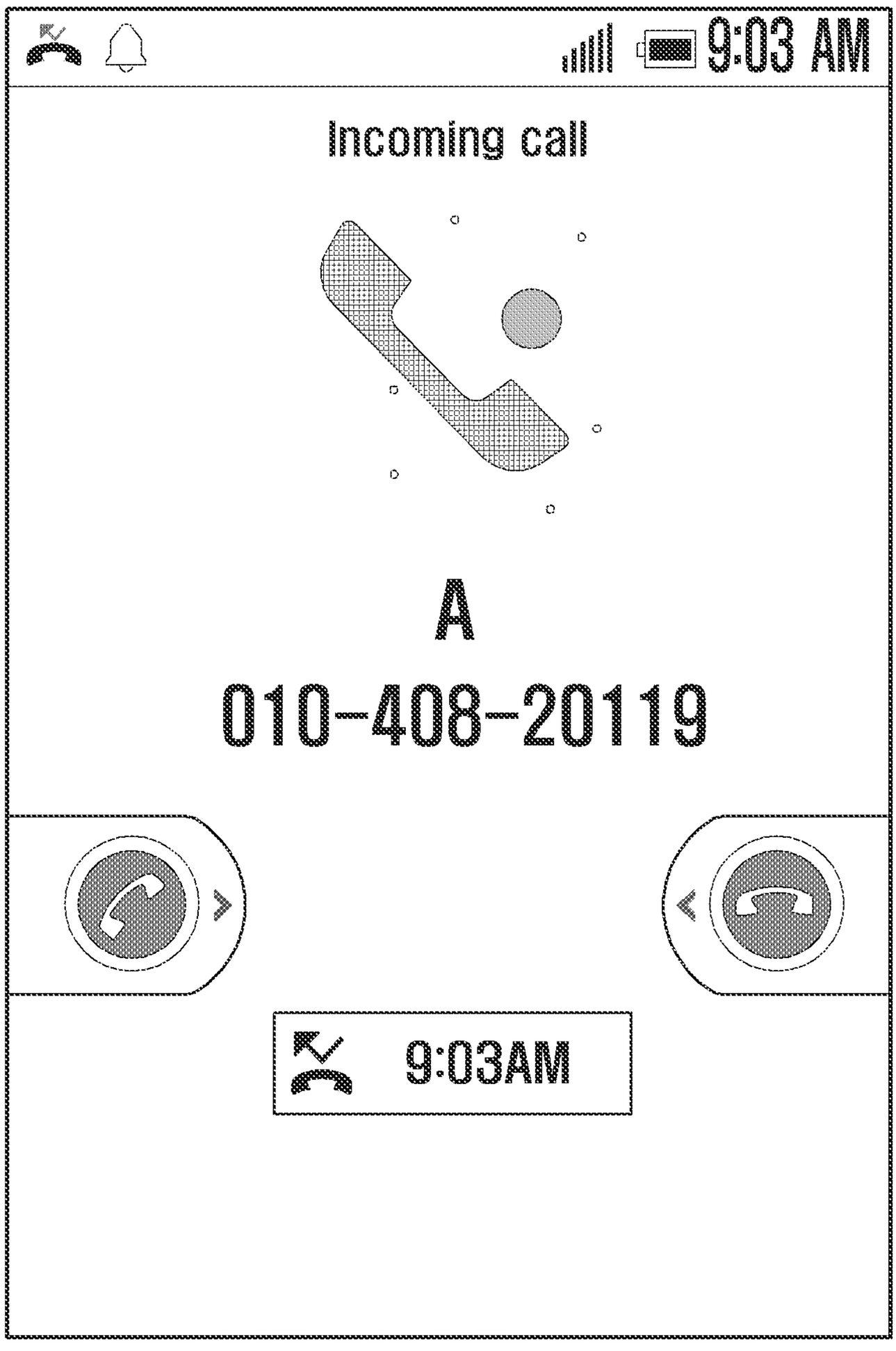


FIG. 5C

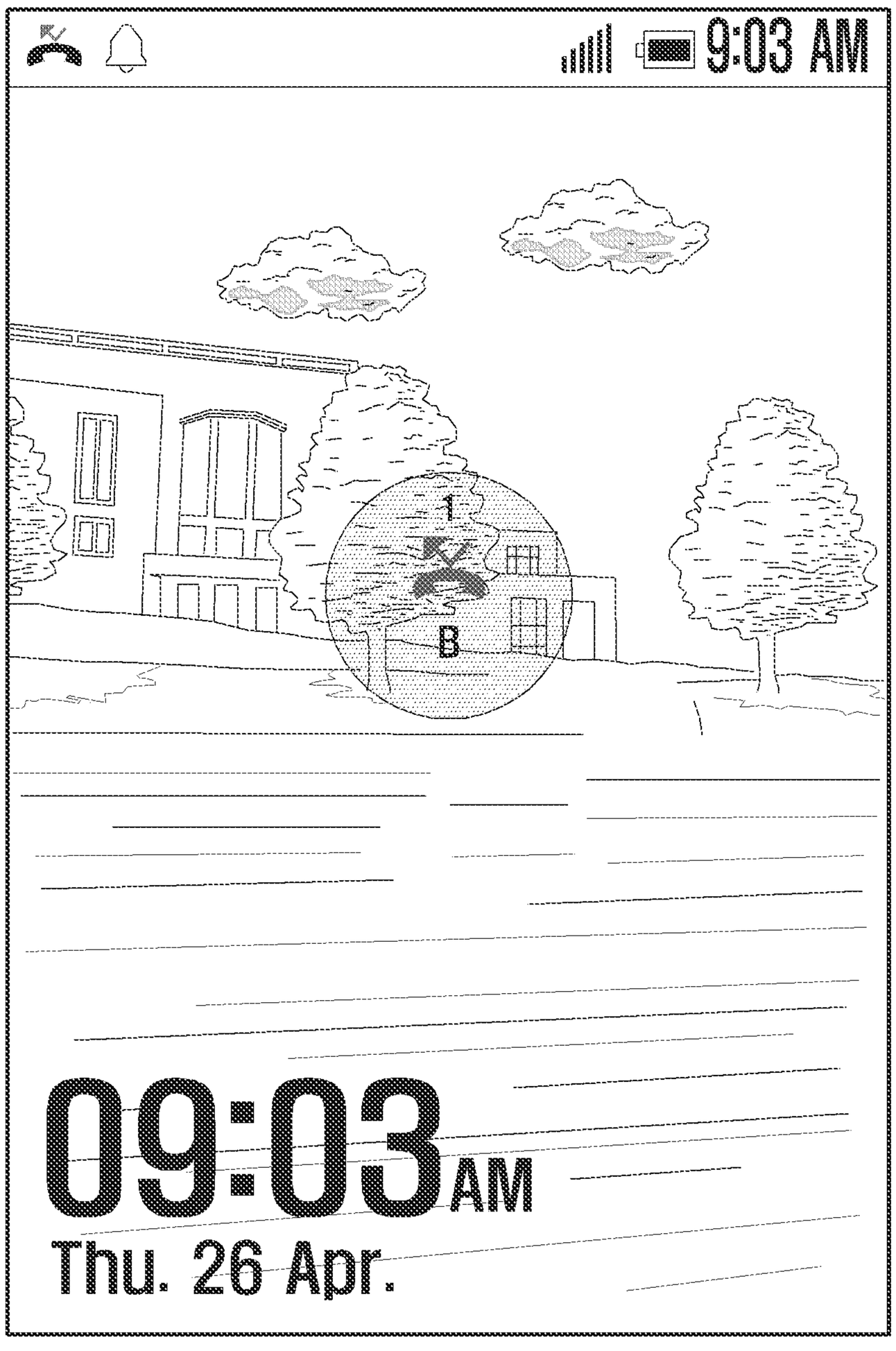


FIG. 6A

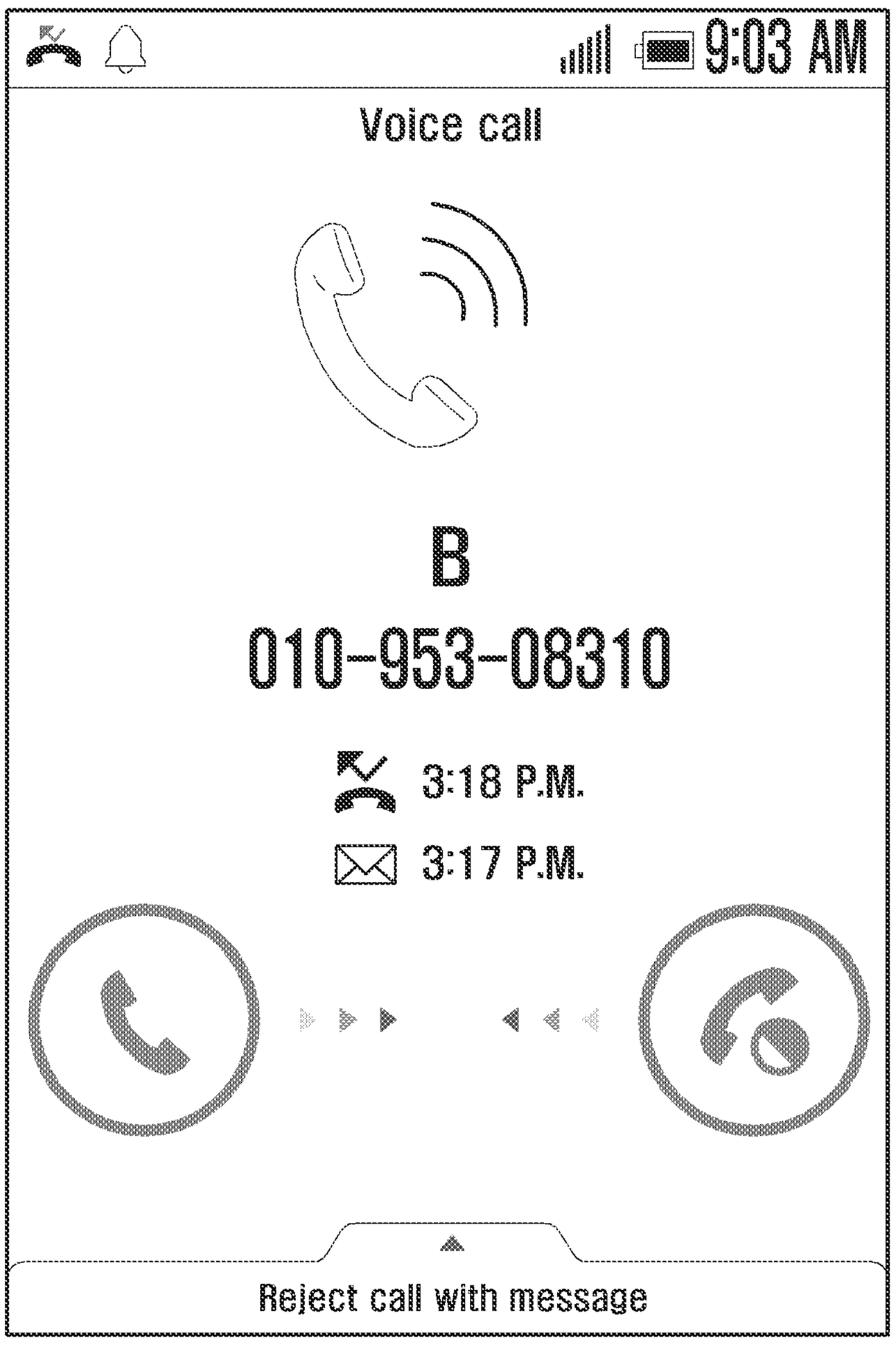

9:03 AM
Voice call
B
010-953-08310
3:18 P.M.
3:17 P.M.
Reject call with message

FIG. 6B

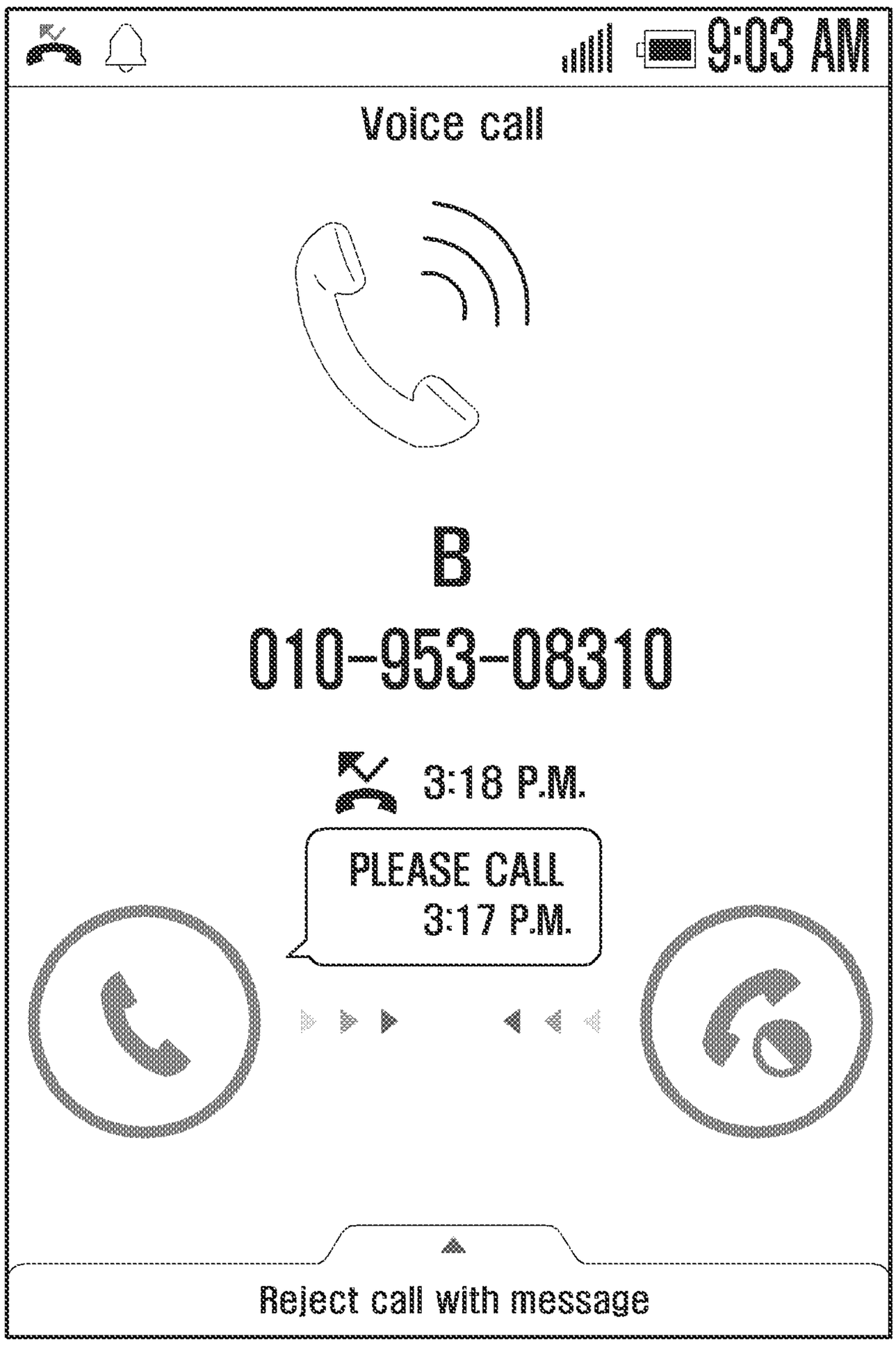

9:03 AM
Voice call
B
010-953-08310
3:18 P.M.
PLEASE CALL
3:17 P.M.
Reject call with message

FIG. 6C

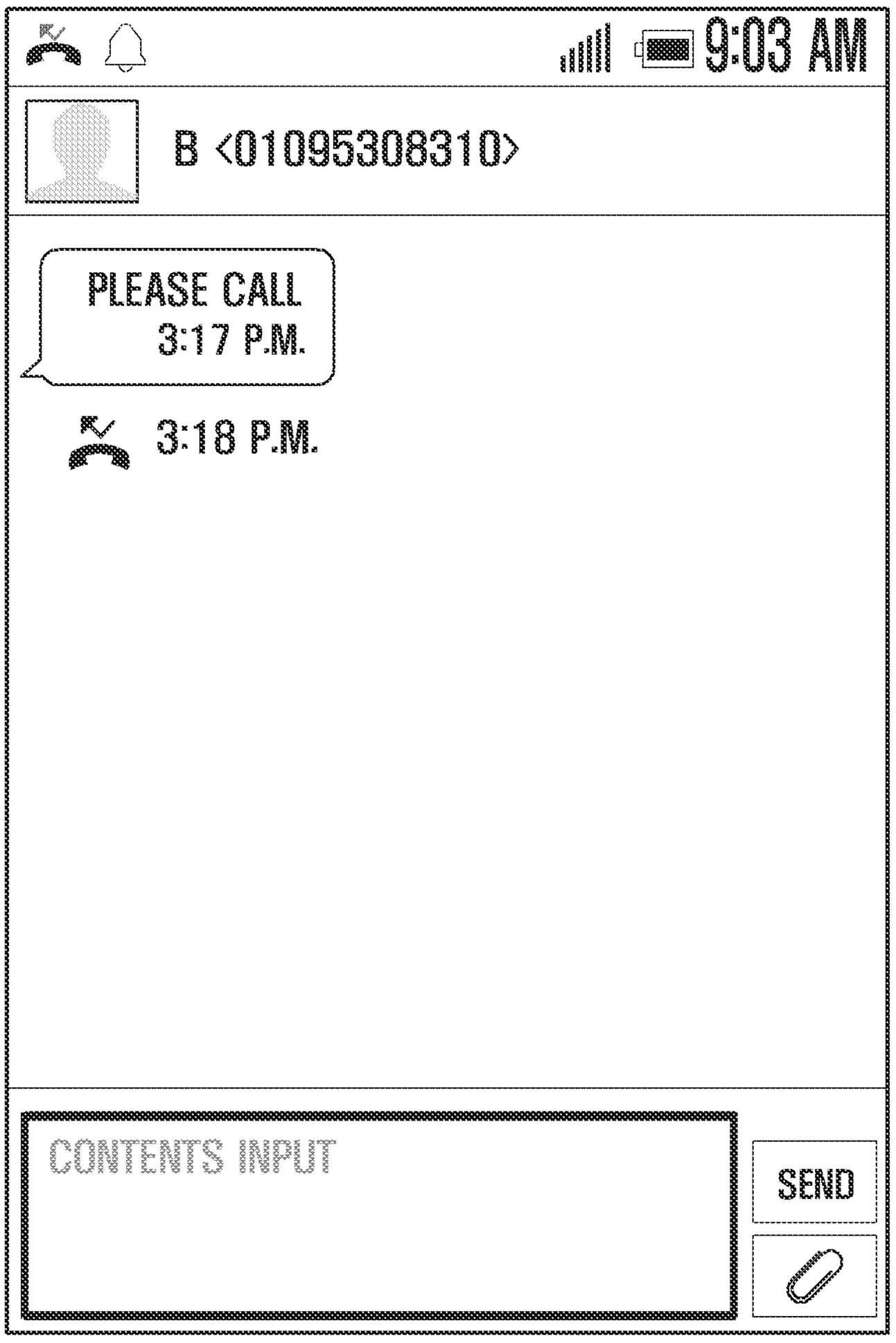
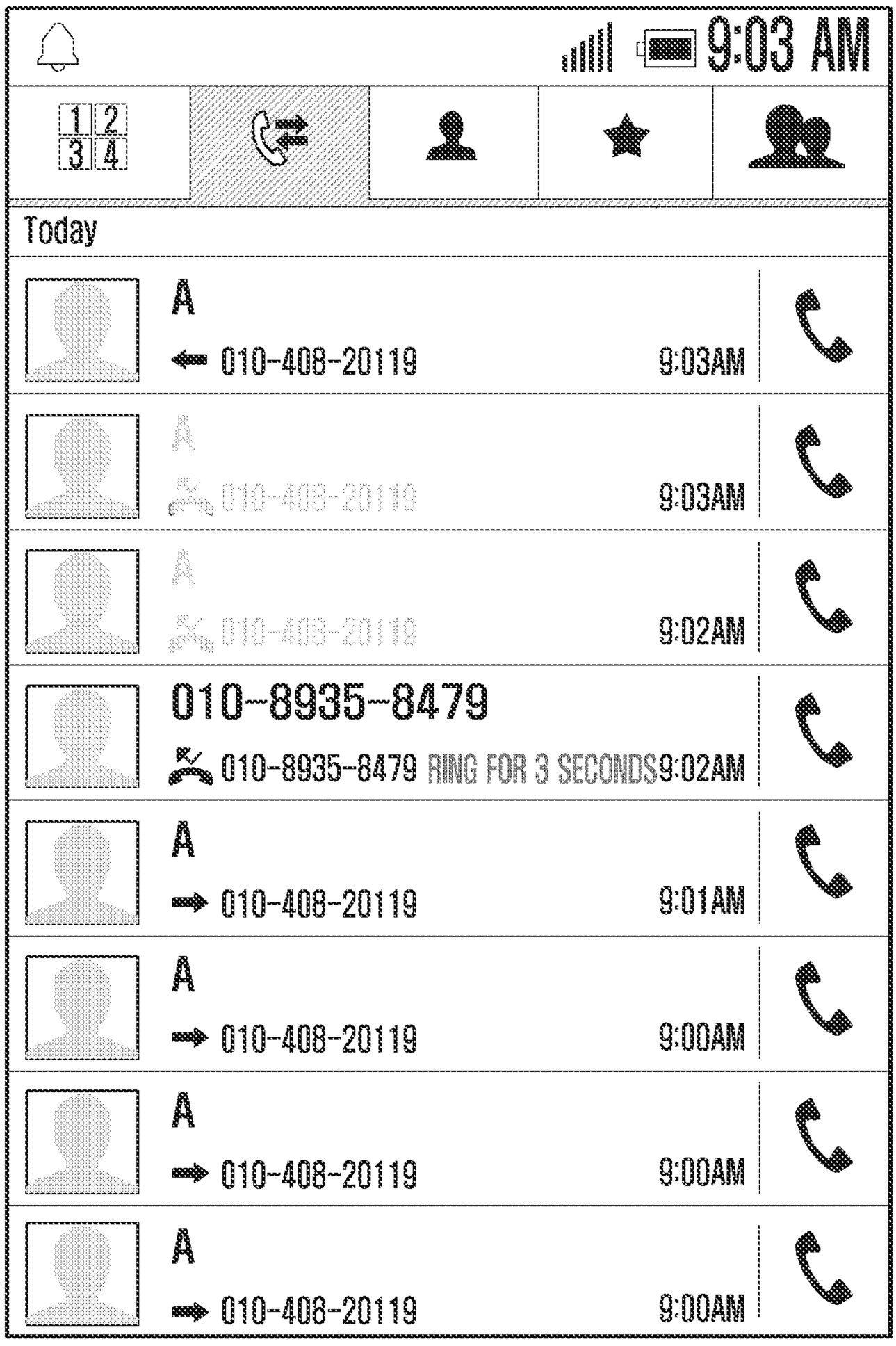

9:03 AM
B <01095308310>
PLEASE CALL
3:17 P.M.
3:18 P.M.
CONTENTS INPUT
SEND

FIG. 7


9:03 AM
Today
A
010-408-20119
9:03AM
A
010-408-20119
9:03AM
A
010-408-20119
9:02AM
010-8935-8479
010-8935-8479 RING FOR 3 SECONDS
9:02AM
A
010-408-20119
9:01AM
A
010-408-20119
9:00AM
A
010-408-20119
9:00AM
A
010-408-20119
9:00AM

METHOD AND APPARATUS FOR DISPLAYING MISSED CALLS ON MOBILE TERMINAL

PRIORITY

This application claims the benefit under 35 U.S.C. § 119(a) of a Korean patent application filed on Sep. 20, 2012 in the Korean Intellectual Property Office and assigned Serial No. 10-2012-0104722, the entire disclosure of which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an additional function of a mobile terminal. More particularly, the present invention relates to a method of variously displaying a message for a missed call according to situations and an apparatus thereof.

2. Description of the Related Art

The mobile terminal market has grown rapidly within a short time due to ongoing advances in technology and the provision of additional functions associated with a smart phone. For example, various applications beyond the basic default applications associated with a mobile terminal have been developed based on requests of users and can be installed on the mobile terminal. Thus, the user may use voice information, character information, video information, Moving Picture Experts Group (MPEG) layer 3 (MP-3), and games through the mobile terminal.

In the related art, event information received in a user's absence while using a mobile terminal is displayed as a message on an idle screen when the user activates a display unit. The absence event includes a push message associated with an application. The message displays the number of received events by type, and is displayed as a text in a pop-up form. Accordingly, the user may check the number of events received in the user's absence by types through an absent message displayed on the idle screen.

However, since the message according to the related art displays only the number of received events in the user's absence, various information such as from whom, how many times, and what type of events are received may not be provided to the user.

Further, in a case in which a call is missed, a message for the missed call disappears only when the user checks a phone history in the user's absence of a call log. That is, since a message for a missed call is displayed or disappears regardless of whether the user connects a call with a missed call phone number, the user may be confused.

Accordingly, there is a need for a method capable of permitting a user to easily check event information received in the user's absence and an apparatus thereof.

The above information is presented as background information only to assist with an understanding of the present disclosure. No determination has been made, and no assertion is made, as to whether any of the above might be applicable as prior art with regard to the present invention.

SUMMARY OF THE INVENTION

Aspects of the present invention are to address at least the above-mentioned problems and/or disadvantages and to provide at least the advantages described below. Accordingly, an aspect of the present invention is to provide a method capable of permitting a user to easily check event information received in the user's absence and an apparatus thereof.

Another aspect of the present invention is to provide a method capable of permitting a user to intuitively recognizing the transaction of an event in the user's absence, thereby improving convenience of the user, and an apparatus thereof.

In accordance with an aspect of the present invention, a displaying method in a mobile terminal is provided. The method includes displaying a message for a missed call for a first number on an idle screen or a call list screen when the missed call is generated from the first number, displaying a call history for the first number on an incoming call screen or an outgoing call screen when a call is received from the first number or the call is transmitted to the first number, and changing the message for the missed call for the first number when a call is connected to the first number and displaying the changed message. The changing of the message for the missed call for the first number includes removing the message for the missed call for the first number from the idle screen, and changing the message for the missed call for the first number and displaying the changed message on the call list screen.

In accordance with another aspect of the present invention, a mobile terminal is provided. The mobile terminal includes a display unit, and a controller controlling to display a message for a missed call for a first number on an idle screen or a call list screen when the missed call is generated from the first number, to display a call history for the first number on an incoming call screen or an outgoing call screen when a call is received from the first number or the call is transmitted to the first number, and to change the message for the missed call for the first number when a call is connected to the first number and display the changed message. The controller controls to remove the message for the missed call for the first number from the idle screen, and to change the message for the missed call for the first number and display the changed message on the call list screen.

Other aspects, advantages, and salient features of the invention will become apparent to those skilled in the art from the following detailed description, which, taken in conjunction with the annexed drawings, discloses exemplary embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other aspects, features, and advantages of certain exemplary embodiments of the present invention will be more apparent from the following description taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a block diagram illustrating an internal configuration of a mobile terminal according to an exemplary embodiment of the present invention;

FIG. **2** is a flowchart illustrating a method of displaying and removing a message for a missed call according to an exemplary embodiment of the present invention;

FIGS. **3**A to **3**F are diagrams illustrating a graphic interface displaying a message for a missed call on an idle screen according to an exemplary embodiment of the present invention;

FIGS. **4**A to **4**D are diagrams illustrating a graphic interface which displays and changes a message for a missed call for one person according to an exemplary embodiment of the present invention;

FIG. **4**E illustrates a call list screen according to an exemplary embodiment of the present invention;

FIGS. **5**A to **5**C are diagrams illustrating a detailed graphic interface which displays and changes a message for a missed call for one or more persons according to an exemplary embodiment of the present invention;

FIGS. **6**A to **6**C are diagrams illustrating examples of a graphic interface displaying a missed call and an absent message in cooperation with each other according to an exemplary embodiment of the present invention; and

FIG. **7** is a diagram illustrating a graphic interface displaying a generation time of an incoming call sound in a call list according to an exemplary embodiment of the present invention.

Throughout the drawings, it should be noted that like reference numbers are used to depict the same or similar elements, features, and structures.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

The following description with reference to the accompanying drawings is provided to assist in a comprehensive understanding of exemplary embodiments of the invention as defined by the claims and their equivalents. It includes various specific details to assist in that understanding but these are to be regarded as merely exemplary. Accordingly, those of ordinary skill in the art will recognize that various changes and modifications of the embodiments described herein can be made without departing from the scope and spirit of the invention. In addition, descriptions of well-known functions and constructions may be omitted for clarity and conciseness.

The terms and words used in the following description and claims are not limited to the bibliographical meanings, but, are merely used by the inventor to enable a clear and consistent understanding of the invention. Accordingly, it should be apparent to those skilled in the art that the following description of exemplary embodiments of the present invention is provided for illustration purpose only and not for the purpose of limiting the invention as defined by the appended claims and their equivalents.

It is to be understood that the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to "a component surface" includes reference to one or more of such surfaces.

In this document, an idle state represents a state where a mobile terminal is turned-on but a display unit is turned-off. Even in the idle state, event information is received from an external terminal. An active state includes a state of displaying an idle screen on a display unit, and refers to an idle state where a user may perform a specific function through key input.

For example, if a specific key provided at a mobile terminal in the idle state is selected, the mobile terminal is converted from the idle state into the active state so that an idle screen is displayed on the display unit. If a folder of a folder type mobile terminal is open, a folder of a slide type mobile terminal is slid, or a folder of a swing type mobile terminal is swung, the mobile terminal is converted from the idle state to the active state so that the idle screen is displayed on the display unit.

In this document, a missed call situation refers to a situation where a call from a corresponding number is not connected; that is, a call from an arbitrary number is missed. The withdrawal of the missed call situation refers to a case of connecting a call for a corresponding number after a call from an arbitrary number is missed. In this document, an absent message refers to a message associated with the missed call and to a message which the user does not check after reception of the message. Furthermore, since the main function of a mobile communication terminal still lies in a voice call and a message sending and receiving, it is important to conveniently provide a message relating to those functions to the user. Accordingly, in the following description, a missed call and an absent message are mainly described. However, the present invention is not limited thereto. That is, the present invention also includes a push message associated with any of a variety of applications.

FIG. **1** is a block diagram illustrating an internal configuration of a mobile terminal according to an exemplary embodiment of the present invention.

Referring to FIG. **1**, the mobile terminal **100** may include a Radio Frequency (RF) communication unit **110**, an audio processor **120**, a touch screen **130**, an input unit **140**, a memory **150**, and a controller **160**.

The mobile terminal **100** is a personal communication terminal having a wireless communication function, and may include a smart phone, a digital broadcasting receiver, a Personal Digital Assistant (PDA), an International Mobile Telecommunication 2000 (IMT-2000) terminal, a Wideband Code Division Multiple Access (WCDMA) terminal, a Universal Mobile Telecommunication Service (UMTS) terminal, and the like.

The RF communication unit **110** performs a transceiving function of corresponding data for wireless communication of the mobile terminal **100**. The RF communication unit **110** may include an RF transmitter up-converting a frequency of a transmitted signal and amplifying the signal, an RF receiver low-noise-amplifying a received signal and down-converting the frequency. Further, the RF communication unit **110** may receive data through a wireless channel and output the received data to the controller **160**, and may transmit data output from the controller **160** through the wireless channel.

The audio processor **120** may be configured by a CODEC. The CODEC may include a data CODEC processing packet data and an audio CODEC processing an audio signal such as a voice. The audio processor **120** converts a digital audio signal into an analog audio signal through the audio CODEC and plays the converted analog audio signal through a speaker (SPK). The audio processor **120** converts an analog audio signal input from a microphone (MIC) into a digital audio signal.

The touch screen **130** includes a touch panel **134** and a display panel **136**. The touch panel **134** detects a touch input of the user. The touch panel **134** may be configured by a touch sensing sensor such as a capacitive overlay sensor, a resistive overlay sensor, an infrared beam sensor, or a pressure sensor. Various types of sensor devices capable of detecting contact or pressure of an object may be configured as the touch panel **134** in addition to the foregoing sensors.

The touch panel **134** detects a touch input of the user and generates and transmits a detection signal to the controller **160**. The detection signal includes coordinate data reflecting the location at which the user inputs the touch. When the user inputs a touch location moving operation, the touch panel **134** generates the detection signal including coordinate data of a touch location moving path to the controller **160**.

The display unit **136** may be configured by a Liquid Crystal Display (LCD), an Organic Light Emitting Diode (OLED), and an Active Matrix Organic Light Emitting Diode (AMOLED). The display unit **130** visually provides a menu of the mobile terminal **100**, input data, function

setting information and other various information to the user. According to an exemplary embodiment of the present invention, the display unit **136** displays a message for an event received in the user's absence and displays a video necessary for processing the event received in the user's absence.

The mobile terminal **100** may include a touch screen, but the exemplary embodiment of the present invention is not only applicable to the mobile terminal **100** including the touch screen. When an exemplary embodiment of the present invention is applied to a mobile terminal having no touch screen, the touch screen shown in FIG. **1** may be changed to perform only a function of the display unit **136**, and the function of the touch panel **134** is performed by an input unit **140** to be described below.

The input unit **140** receives an input of the user for controlling the mobile terminal **100** and generates and transfers an input signal to the controller **160**. The input unit **140** may be configured by a key pad including numeric keys and arrow keys, and may be provided at one side of the mobile terminal **100** by a given function key. According to exemplary embodiments of the present invention, all operations of the mobile terminal **100** are possible by only the touch screen **130**. In this case, the touch panel **134** may execute a function of the input unit **140**.

The memory **150** stores programs and data necessary for an operation of the mobile terminal **100**. The memory **150** may be divided into a program area and a data area.

The program area may store a program for controlling an overall operation of the mobile terminal **100**, and a program provided for default operations in the mobile terminal such as an operating system for booting the mobile terminal **100**. The program area of the memory **150** may store an application separately installed by the user, for example, a game application, a social network service execution application, and the like. More particularly, the program area may store a program for processing an event received in the user's absence.

The data area is an area for storing data generated according to use of the mobile terminal **100**, and may store images, moving images, phone-books, and audio data. More particularly, the data area may store event information received in the user's absence.

The controller **160** controls an overall operation of respective constituent elements of the mobile terminal **100**. More particularly, the controller **160** may classify a type of an event received in a user's absence, and determine whether a missed call is generated.

For example, when the event received in the user's absence is a missed call from another user A, the controller **160** controls the display unit **136** to display a message for the missed call from A. At the same time, the controller **160** controls the display unit **136** to include the message for the missed call from A in a call list screen.

Meanwhile, when calls from a plurality of users are missed, the controller **160** may manage messages for the missed calls according to the caller (i.e., user) number. An exemplary user interface for displaying the message for the missed call will be described later with reference to the accompanying drawings.

After the call is missed, when a call is received from the user A, associated with the missed call, or the call is transmitted to A, the controller **136** displays a call history for A on an incoming call screen or an outgoing call screen. That is, when the call is received or transmitted from the same number after the call is missed, the controller **160** may control the display unit **136** to display a past call history with the number on the incoming call screen or the outgoing call screen.

If the call is connected to the same number so that the missed call situation is released after the generation of the missed call, the controller **160** may control the display unit **130** to remove or change the message for the missed call for the number in the idle screen. If the missed call situation for A is released, the controller **160** may change a display associated with A on the call list screen.

When there exists an absent message for the same user as well as a missed call, the controller **160** may display the absent message on the outgoing call screen or the incoming call screen.

A more detailed user interface of the display screen will be described with reference to the accompanying drawings.

FIG. **2** is a flowchart illustrating a method of displaying and removing a message for a missed call according to an exemplary embodiment of the present invention.

Referring to FIG. **2**, when a call is received or transmitted in step **210**, the controller **160** determines whether a call is connected in step **220**. If the call is not connected, it means that the call has been missed for a corresponding number, and the controller **160** displays a message for the missed call on an idle screen or a call list screen in step **225**.

If it is determined in step **220** that the call is connected, the controller **160** checks a missed call history for the number to which the call is connected in step **230**. If it is determined in step **230** that there exists a missed call for the number, the controller **160** determines if the call is connected to the same number associated with the missed call in step **240**. That is, if the call is connected to the same number, it may be determined that the missed call situation for the corresponding number is released.

If it is determined in step **240** that the call is connected to the same number associated with the missed call, the controller **160** may change and display the message for the missed call in step **250**. In more detail, the controller **160** may remove a message for a missed call on an idle screen and change at least one of a shape, a form, a color, or a combination thereof of the message for a missed call for the number on a call list screen and display the changed message. Also, the controller **160** may change the display in the user's absence of the call history in step **260**.

On the other hand, if it is determined in step **240** that the call is not connected to the same number associated with the missed call, it may be determined that an event associated with the missed call for the number is not generated. Accordingly, the controller **160** maintains display of the missed call without changing the display of the message for the missed call in step **245**. In more detail, the controller **160** maintains a state in which a message for a missed call for the number is not displayed, and maintains a message for a missed call for another number when the missed call for the other number is displayed.

FIGS. **3**A to **3**F are diagrams illustrating a graphic interface displaying a message for a missed call on an idle screen according to an exemplary embodiment of the present invention

FIG. **3**A illustrates a case of displaying a generation number of a missed call together with a message icon for the missed call on an idle screen without separately classifying a caller number. More specifically, FIG. **3**A illustrates a message display when there exist five missed calls, and the five missed calls may be generated by the same number or different numbers.

FIG. **3**B illustrates an example of displaying a message for a missed call when the missed call is generated by one user. More specifically, FIG. **3**B illustrates that two missed calls are generated by another user A. The user A may be a caller number or a name stored in a phone book for the caller number.

FIG. **3**C illustrates a case where a caller number of a missed call, and the number of missed calls for a corresponding number are displayed together with a message icon for the missed call. More specifically, FIG. **3**C illustrates that one call from user A is missed, two calls from user B are missed, and two calls from user C are missed. In the case of a smart phone, it is preferable that the missed call is displayed on a first page of an idle screen.

FIG. **3**D illustrates a case of connecting a call with a corresponding number by selecting message display of the missed call according to the exemplary embodiment of the present invention. More specifically, as shown in FIG. **3**D, the user selects the message display associated with the calls missed from user C on the idle screen to attempt call connection with a corresponding number of user C.

FIG. **3**E illustrates an example of an interface for a call connection screen with a sender of the missed call. According to the exemplary embodiment of the present invention, a missed call history and sender information about sender C of the missed call may be displayed on an incoming call screen or an outgoing call screen for the sender C.

In FIG. **3**F, when the call is connected so that a missed call situation for C is released, message display of the missed call for C may be removed on the idle screen. However, since the missed call situations for remaining users A and B are not released, the message displays of the missed calls from users A and B are maintained on the idle screen. In addition, the message for the missed call from user C is changed and displayed on the call list screen (not shown).

FIGS. **4**A to **4**D are diagrams illustrating a graphic interface which displays and changes a message for a missed call for one person according to an exemplary embodiment of the present invention.

FIG. **4**A illustrates a graphic interface when one call for one user is missed. When two calls for the same user are missed, message display of the missed calls on the idle screen may be as shown in FIG. **4**B. When user again receives a phone call from user A, a graphic interface of the incoming call screen is illustrated in FIG. **4**C.

FIG. **4**C illustrates an example of an incoming call screen displayed when the user is telephoned by user A. According to the exemplary embodiment of the present invention, recent past call history and sender information may be displayed on the incoming call screen while reporting that the call from user A is missed. In exemplary embodiments of the present invention, the call history may include a message reception/transmission list, contents of the message, an incoming/outgoing call list, and a missed call. Meanwhile, the sender information may include a schedule, a memo, Social Networking Service (SNS) contents related with a sender, and the like.

Meanwhile, in FIG. **4**C, if a call is terminated after being connected with user A, as shown in FIG. **4**D, display of the missed call from user A is removed from a lock screen and the idle screen except for a call list screen.

FIG. **4**E illustrates a call list screen according to an exemplary embodiment of the present invention.

Referring to FIG. **4**E, a message for the missed call may be changed and the changed message may be displayed without removal. Since the missed call situation for A is released, a missed call history of user A may be transparently displayed as shown in FIG. **4**E. According to exemplary embodiments of the present invention, the number that released the missed call situation may be transparently displayed on a call list screen, the color of the number may be changed and displayed, the number may be displayed with an icon different from other numbers to be distinguished, and the like.

That is, according to exemplary embodiments of the present invention, the message for the missed call for the number that released the missed call situation is removed on the idle screen, so that unnecessary recall may be prevented as the call list screen is changed.

FIGS. **5**A to **5**C are diagrams illustrating a graphic interface which displays and changes a message for a missed call for one or more persons according to an exemplary embodiment of the present invention.

FIG. **5**A illustrates a graphic interface when one missed call from A is generated and one missed call from B is generated. Meanwhile, different from FIG. **5**A, a message for a missed call may be displayed by displaying only the generation number of missed calls for a simple graphic interface without classifying A and B so as to implement a simple graphic interface. In this case, when the user again receives a phone call from user A, a graphic interface of the incoming call screen is shown in FIG. **5**B.

FIG. **5**B illustrates an example of an incoming call from user A that is screened.

According to exemplary embodiments of the present invention, recent past call history and sender information may be displayed on the incoming call screen while reporting that the call from user A is missed.

Meanwhile, if a call is terminated after being connected with A in FIG. **5**B, display of the missed call generated by user A may be removed on a lock screen and the idle screen except for a call list screen as shown in FIG. **5**C. However, display of the missed call for user B should be maintained. That is, since the missed call situation for user B is not released, it may be displayed on the idle screen that one missed call from user B exists, as shown in FIG. **5**C.

In a case of the call list screen (not shown), the call list screen is displayed to distinguish a case of user A, where a real call is achieved after generation of the missed call, from a case of user B, where the call is not achieved yet after the generation of the missed call, so that the user may easily recognize the presence of the missed call. For example, in a case of user A where the missed call is released, a missed call list may be transparently displayed, the color of the missed call list may be changed to be displayed, an icon different from B may be displayed to distinguish A from B, and the like.

FIGS. **6**A to **6**C are diagrams illustrating examples of a graphic interface displaying a missed call and an absent message in cooperation with each other according to an exemplary embodiment of the present invention.

When a user does not make contact with user A of the missed call for a predetermined time, user A may send a message requesting a phone call to the user. Further, user A may make a phone call to the user as user A gets no answer after sending the message. In both of the cases, the user receives a missed call and an absent message having the same purpose from the same person. Accordingly, exemplary embodiments of the present invention display the missed call and the absent message in connection with each other.

FIGS. **6**A and **6**B illustrate an example of an outgoing call screen or an incoming call screen for user A when the missed call is generated by user A. According to exemplary embodi-

ments of the present invention, a message for the missed call and a notification of absent message for user A may be simultaneously displayed as shown in FIG. **6**A, and contents of the absent message may be displayed as shown in FIG. **6**B.

As another exemplary embodiment, at first, only the notification of the absent message may be displayed as shown in FIG. **6**A, and, only when the user selects the notification of the absent message, the content of the absent message may be displayed as shown in FIG. **6**B. In this case, when the absent message is displayed, the notification of absent message is removed. Otherwise, the notification of the absent message may be maintained.

Meanwhile, when the user first checks the absent message in a state that the missed call is not checked, as shown in FIG. **6**C, the message for the missed call for the number may be displayed on a message check screen. Next, display of the missed call for the number may be removed on a screen such as a lock screen, an idle screen, and a message bar, and may be maintained only on a call list screen.

That is, according to exemplary embodiments of the present invention, when a missed call history or an absent message is checked in connection with the missed call and the absent message, it may be displayed that the missed call and the absent message are checked in a call log. In more detail, when the missed call or the absent message is generated and the user enters a call log to select a missed call list, the controller **160** may display the content of an absent message generated by the same sender or the generation of the absent message.

Further, if message display is selected when the notification of an absent message is displayed, detailed contents of the message can be displayed after the screen moves to a connected absent message. Further, when an absent message item is selected, detailed call history of the missed call may be displayed.

FIG. **7** is a diagram illustrating a graphic interface displaying a generation time of an incoming call sound in a call list according to an exemplary embodiment of the present invention.

Referring to FIG. **7**, in a case of a missed call having a ringing time of an incoming call sound less than a given time, for example, when the incoming call sound is rung once or for a moment, a ringing time of the incoming call may be displayed together with a message for the missed call. Further, a separate icon may be displayed instead of the generation time of the incoming call sound. This is to provide a possibility of a wrong number or a spam call to the user.

However, the present invention is not limited in displaying a generation time of incoming call sound only when the missed call has a short ringing time. That is, the ringing time of the incoming call sound for all missed calls may be displayed, and, in a case of a missed call having a long ringing time, an icon different from that of the missed call having a short ringing time is also displayed. For example, the missed call that generates an incoming call sound for a long time as a sender continuously attempts the call may be important. In this case, a possibility of requiring a rapid answer may be transferred to the user.

According to exemplary embodiments of the present invention, since a message for a missed call is managed by senders, the user can more efficiently manage an event received in the user's absence. According to exemplary embodiments of the present invention, an absent message is removed when call connection is achieved after the missed call is generated, thereby, convenience of a user is increased and the user can intuitively recognize the transaction of the missed call.

While the invention has been shown and described with reference to certain exemplary embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims and their equivalents.

What is claimed is:

1. A method for managing calls on a mobile terminal, the method comprising:

automatically displaying a numeric notification indicating a number of missed calls from one or more terminals if a missed call has occurred;

establishing a call with a first terminal among the one or more terminals corresponding to the missed calls and displaying a call connection screen during the call; and

in response to the call with the first terminal among the one or more terminals corresponding to the missed calls being disconnected, automatically reducing the numeric notification by a number of missed calls from the first terminal from a total number of missed calls, and displaying the reduced numeric notification.

2. The method of claim **1**, further comprising:

displaying a telephone communication icon,

wherein the telephone communication icon comprises an image of a telephone.

3. The method of claim **1**, further comprising:

determining a number of missed calls from a second terminal,

wherein the automatically displaying of the numeric notification comprises displaying the numeric notification corresponding to the total number of missed calls including the number of missed calls from the first terminal and the number of missed calls from the second terminal.

4. The method of claim **3**,

wherein the reducing of the numeric notification comprises reducing the determined number of missed calls from the first terminal from the total number of missed calls including the number of missed calls from the first terminal and the number of missed calls from the second terminal.

5. The method of claim **3**, further comprising:

establishing a call with the second terminal; and

wherein the reducing of the numeric notification comprises removing the numeric notification.

6. The method of claim **1**, further comprising:

missing another call from the first terminal; and

increasing the numeric notification to include a total number of missed calls from the first terminal.

7. The method of claim **6**, further comprising:

missing a call from a second terminal; and

increasing the numeric notification to include the total number of missed calls from the first terminal plus the missed call from the second terminal.

8. The method of claim **7**, further comprising:

establishing a call with the first terminal,

wherein the reducing of the numeric notification further comprises reducing the numeric notification by the total number of missed calls from the first terminal to indicate only the missed call from the second terminal.

9. A mobile terminal for managing calls, the mobile terminal comprising:

a display; and

a processor electrically coupled with the display and configured to:

control the display to automatically display a numeric notification indicating a number of missed calls from one or more terminals if a missed call has occurred,

establish a call with a first terminal among the one or more terminals corresponding to the missed calls and control the display to display a call connection screen during the call, and

in response to the call with the first terminal among the one or more terminals corresponding to the missed calls being disconnected, automatically reduce the numeric notification by a number of missed calls from the first terminal from a total number of missed calls, and control the display to display the reduced numeric notification.

10. The mobile terminal of claim **9**,

wherein the processor is further configured to control the display to display a telephone communication icon, and

wherein the telephone communication icon comprises an image of a telephone.

11. The mobile terminal of claim **9**, wherein the processor is further configured to:

determine a number of missed calls from a second terminal, and

automatically display the numeric notification by displaying the numeric notification corresponding to the total number of missed calls including the number of missed calls from the first terminal and the number of missed calls from the second terminal.

12. The mobile terminal of claim **11**, wherein the processor is further configured to reduce the numeric notification by reducing the determined number of missed calls from the first terminal from the total number of missed calls including the number of missed calls from the first terminal and the number of missed calls from the second terminal.

13. The mobile terminal of claim **11**,

wherein the processor is further configured to establish a call with the second terminal, and

wherein the reducing of the numeric notification comprises removing the numeric notification.

14. The mobile terminal of claim **9**, wherein the processor is further configured to:

determine if another call is missed from the first terminal, and

increase the numeric notification to indicate include a total number of missed calls from the first terminal.

15. The mobile terminal of claim **14**, wherein the processor is further configured to:

determine if a call is missed from a second terminal, and

increase the numeric notification to include the total number of missed calls from the first terminal plus the missed call from the second terminal.

16. The mobile terminal of claim **15**, wherein the processor is further configured to:

establish call with the first terminal, and

reduce the numeric notification by decreasing the numeric notification by the total number of missed calls from the first terminal to indicate only the missed call from the second terminal.

17. A method for managing calls on a mobile terminal, the method comprising:

automatically displaying a numeric notification indicating a number of one or more missed calls from a first terminal and a second terminal, the numeric notification corresponding to a total number of missed calls from the first terminal and the second terminal, when one or more missed calls has occurred;

establishing a call with at least one of the first terminal or the second terminal and displaying a call connection screen during the call; and

in response to the call with the at least one of the first terminal or the second terminal being disconnected, automatically reducing the numeric notification by the number of missed calls from one of the first terminal or the second terminal from the total number of missed calls, and displaying the reduced numeric notification.

18. The method of claim **17**, further comprising:

displaying a telephone communication icon,

wherein the telephone communication icon comprises an image of a telephone.

19. The method of claim **17**, wherein the reducing of the numeric notification comprises reducing the numeric notification by the number of missed calls from the first terminal.

20. The method of claim **19**, further comprising:

establishing a call with the second terminal,

wherein the reducing of the numeric notification further comprises reducing the numeric notification by the number of missed calls from the second terminal.

21. The method of claim **1**, wherein the numeric notification includes a numeric counter indicating the number of missed calls from the first terminal.

22. The mobile terminal of claim **9**, wherein the processor is further configured to:

establish a call with the second terminal, and

reducing the numeric notification by reducing the number of missed calls from the second terminal from the total number of missed calls.

23. The method of claim **1**, wherein the reducing of the numeric notification comprises removing the numeric notification.

24. The mobile terminal of claim **9**, wherein the processor is further configured to reduce the numeric notification by removing the numeric notification.

25. The method of claim **20**, wherein the reducing of the numeric notification comprises removing the numeric notification.

26. A mobile terminal for managing calls, the mobile terminal comprising:

a display; and

a processor electrically coupled with the display and configured to:

control the display to automatically display a numeric notification indicating a number of one or more missed calls from a first terminal and a second terminal, the numeric notification corresponding to a total number of missed calls from the first user terminal and the second user terminal, when one or more missed calls has occurred,

establish a call with at least one of the first terminal or the second terminal and control the display to display a call connection screen during the call, and

in response to the call with the at least one of the first terminal or the second terminal being disconnected, automatically reduce the numeric notification by the number of missed calls from one of the first terminal or the second terminal from the total number of missed calls, and control the display to display the reduced numeric notification.

27. The mobile terminal of claim **26**,

wherein the processor is further configured to display a telephone communication icon, and

wherein the telephone communication icon comprises an image of a telephone.

28. The mobile terminal of claim **26**, wherein the processor is further configured to reduce the numeric notification by reducing the numeric notification by the number of missed calls from the first terminal.

29. The mobile terminal of claim **28**, wherein the processor is further configured to:

establish a call with the second terminal, and

reduce the numeric notification by reducing the number of missed calls from the second terminal from the total number of missed calls.

30. The mobile terminal of claim **29**, wherein the processor is further configured to reduce the numeric notification by removing the numeric notification.

* * * * *